

CLAIMS

1. A multicarrier transmission apparatus comprising:

a symbol formation section that forms symbols made up of Ich components and Qch components from transmission data;

an interleaver that interleaves said Ich components and/or Qch components independently of each other;

an IQ combination section that combines the interleaved Ich components and Qch components and obtains modulation diversity modulation symbols;

an OFDM modulation section that assigns modulation diversity modulation symbols to any one of a plurality of subcarriers which are orthogonal to one another and modulates subcarriers using the modulation diversity modulation symbols; and

an interleave pattern setting section that sets an interleave pattern in said interleaver according to channel quality of said subcarriers.

2. The multicarrier transmission apparatus according to claim 1, further comprising

a ranking section that ranks the channel quality of said subcarriers, wherein

said interleave pattern setting section sets an interleave pattern such that the sum of the rankings of

subcarriers to which Ich components and Qch components of said symbols before interleaving are assigned is averaged among symbols.

3. The multicarrier transmission apparatus according to claim 1, further comprising

an interleave pattern storage section that stores a plurality of interleave patterns, wherein

said interleave pattern setting section performs a simulation using said plurality of interleave patterns and channel quality of subcarriers in advance and selects an interleave pattern whereby an optimum modulation diversity effect can be obtained from among said plurality of interleave patterns as the interleave pattern to be used for said interleaver.

4. The multicarrier transmission apparatus according to claim 1, wherein said interleave pattern setting section comprises:

an interleaver that interleaves a channel quality value of said subcarriers using an interleave pattern for Ich components and/or interleave pattern for Qch components;

an addition section that adds up interleaved Ich channel quality values and Qch channel quality values in subcarrier units;

a variance calculation section that calculates a

variance value of the addition result; and

a minimum value calculation section that selects an interleave pattern having a minimum variance from among the plurality of interleave patterns.

5. The multicarrier transmission apparatus according to claim 1, wherein said interleave pattern setting section comprises:

an interleaver that interleaves the channel quality value of said subcarriers using an interleave pattern for I_{ch} components and/or an interleave pattern for Q_{ch} components;

a subtraction section that performs subtractions between the channel quality values of interleaved I_{ch} and channel quality values of Q_{ch} in subcarrier units;

an absolute value addition section that calculates the sum of absolute values of subtraction results in subcarrier units; and

a maximum value calculation section that selects the interleave pattern having a maximum sum of said absolute values from among the plurality of interleave patterns.

6. (Deleted)

7. The multicarrier transmission apparatus according to claim 1, wherein said interleave pattern setting section sets an interleave pattern whereby said I_{ch} components and

Qch components are not assigned to subcarriers whose channel quality is a predetermined value or below.

8. The multicarrier transmission apparatus according to claim 1, wherein said interleave pattern setting section sets an adaptive interleave pattern according to channel quality of subcarriers for said Ich components and Qch components assigned to said subcarriers having high channel quality and low channel quality and sets a random interleave pattern for said Ich components and Qch components assigned to said subcarriers having medium channel quality.

9. The multicarrier transmission apparatus according to claim 1, further comprising an iteration symbol formation section that forms identical first and second symbols for sequentially input symbols, wherein

 said interleave pattern setting section sets an interleave pattern whereby Ich of said first symbol and Qch of said second symbol are sequentially assigned to subcarriers in descending order of channel quality and Qch of said first symbol and Ich of said second symbol are sequentially assigned to subcarriers in ascending order of channel quality.

10. A multicarrier reception apparatus comprising:

 an OFDM demodulation section that extracts modulation diversity symbols superimposed on subcarriers of a received

multicarrier signal;

a deinterleaver that deinterleaves Ich components and/or Qch components of said modulation diversity modulation symbols using an interleave pattern according to channel quality of subcarriers;

an IQ combination section that combines the deinterleaved Ich components and Qch components; and a demapping section that obtains received data by demapping the symbols after the combination.

11. (Deleted)

12. The multicarrier reception apparatus according to claim 10, further comprising:

a propagation path state estimation section that obtains channel quality of subcarriers; and

a transmission section that transmits information indicating the channel quality of said subcarriers to the multicarrier transmission apparatus that transmits a signal on which said modulation diversity modulation symbols are superimposed,

wherein a plurality of adjacent subcarriers are grouped and one piece of channel quality information per group out of the channel quality information of said subcarriers is transmitted to said multicarrier transmission apparatus.

13. The multicarrier reception apparatus according to claim

10, further comprising:

a propagation path state estimation section that obtains channel quality of subcarriers; and

a transmission section that transmits information indicating the channel quality of said subcarriers to the multicarrier transmission apparatus that transmits a signal on which said modulation diversity modulation symbols are superimposed,

wherein said channel quality information is transmitted to said multicarrier transmission apparatus at shorter time intervals as a Doppler frequency increases.

14. The multicarrier reception apparatus according to claim 10, further comprising:

a propagation path state estimation section that obtains channel quality of subcarriers; and

a transmission section that transmits information indicating the channel quality of said subcarriers to the multicarrier transmission apparatus that transmits a signal on which said modulation diversity modulation symbols are superimposed,

wherein when the Doppler frequency equals to or exceeds a predetermined value, transmission of information indicating the channel quality of said subcarriers to said multicarrier transmission apparatus is stopped.

15. The multicarrier reception apparatus according to claim 10, further comprising:

a propagation path state estimation section that obtains channel quality of subcarriers; and

a transmission section that transmits information indicating the channel quality of said subcarriers to the multicarrier transmission apparatus that transmits a signal on which said modulation diversity modulation symbols are superimposed,

wherein the channel quality of said subcarriers is classified according to the degree of channel quality and information indicating a class of subcarriers is transmitted to said multicarrier transmission apparatus as information indicating the channel quality of said subcarriers.

16. A multicarrier communication method comprising:

a step of detecting channel quality of subcarriers; and
a modulation diversity modulation step of carrying out modulation diversity modulation while adaptively changing an interleave pattern of Ich components and/or Qch components according to channel quality of subcarriers.